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NETGEAR ProSAFE M4300 Series 10-GbE Switch Tutorial

**by Benjamin Kenawell, Brian Phelan, Kelly D Sherbondy, and
Ram Narayanan**

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NETGEAR ProSAFE M4300 Series 10-GbE Switch Tutorial

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14. ABSTRACT A NETGEAR m4300 series managed network switch provides unparalleled control over a single network. The disadvantage is a steep learning curve, which this technical note helps alleviate by providing instructions to perform the setup of a simple local area network. It also attempts to explain the process along with other options, including port tagging, multiple virtual local area networks, and additional switches, which may be useful in reducing latency and improving throughput.					
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Contents

List of Figures	iv
1. Introduction	1
2. Startup	1
3. Connecting to the Switch	1
4. Connecting to the Management Interface	1
5. Saving a Configuration	3
6. Adding/Deleting Users	3
7. Setting Up a DHCP Virtual Local Area Network (VLAN)	3
7.1 Setting Up a New VLAN	4
7.2 Add an Interface to the VLAN	4
7.3 Untag All Ports	5
7.4 Assign Ports to Use VLAN	6
7.5 Excluding IP Addresses	7
7.6 Setting Up a DHCP Pool	7
8. Static Network	8
9. Port Aggregation/Link Aggregation Control Protocol	9
9.1 Adding LAG to VLAN	9
9.2 Adding Ports to LAG	10
9.3 Checking the LAG	10
10. Stacking Switches	11
11. Conclusion	11
12. References	12
Distribution List	13

List of Figures

Fig. 1	NETGEAR login.....	2
Fig. 2	Maintenance tab	3
Fig. 3	Setting up a new VLAN.....	4
Fig. 4	Adding an interface.....	5
Fig. 5	Untagging all ports.....	6
Fig. 6	Assigning ports	7
Fig. 7	Excluding IP addresses	7
Fig. 8	DHCP pool configuration	8
Fig. 9	Adding ports to the LAG	10
Fig. 10	LAG settings and ports	11

1. Introduction

The NETGEAR ProSAFE M4300¹ series 10-GbE network switch is a fully managed switch. As such, it has lots of options that may seem complicated at first. Once the user learns the terminology and thought process behind the options, such a switch has a very powerful user interface for fine tuning control of data sent over the network to improve throughput of transfers.

This report provides a short overview and quick tutorial on how to set up some simple but important settings on the switch and lays a foundation for understanding how to proceed in order to achieve maximum bandwidth and throughput of the switch.

2. Startup

To start up the switch, plug it into any 120-V wall outlet. The power light will turn solid yellow and then green after a minute or 2. If the light starts blinking yellow, the switch is not working properly. Once the light turns green, the switch is ready to use.

3. Connecting to the Switch

Next, plug in a connector, RJ45 or SFP+.

Windows will sometimes show an IP address without a gateway. This is not the IP address of the machine. Wait until it has a gateway, the IP address will probably change as well, and then that is the IP address of the machine. Linux does not do this. In either case, the computer should have its final IP address within a minute. In our case, it was in the 192.168.40.0/24 subnet.

4. Connecting to the Management Interface

The out-of-band (OOB) management port on the front of the system is guaranteed to work in case the other ports are not dynamically assigning IP addresses.

For our management interface, the username is “radar” and the password is “ARLpassword12” for all of these methods. Figure 1 shows the NETGEAR login.

The image shows a login form for a NETGEAR device. At the top left is the word "Login" in a purple font. To the right of "Login" is a small purple circle containing a white question mark. Below "Login" is a rectangular box with a purple border. Inside this box, there are two input fields: the first is labeled "Username*" and the second is labeled "Password". To the right of each label is a white rectangular input field. At the bottom right of the box is a blue button with the word "Login" in white text.

Fig. 1 NETGEAR login

The following are various connection options:

- 1) To connect to the NETGEAR ProSAFE switch through a Dynamic Host Configuration Protocol (DHCP) port, open a web browser and navigate to 192.168.40.1.
- 2) To connect to the switch through any of the 16 main ports:
 - a) Open up a web browser and navigate to 192.168.40.1.
 - b) Alternatively, set a network adapter to a static IP of 169.254.100.201.
 - c) Open a web browser and navigate to 169.254.100.100.
- 3) To connect to the NETGEAR ProSAFE switch through the OOB port through a wire Ethernet connection:
 - a) Set the network adapter for a static IPv4 address of 169.254.101.201.
 - b) Open up a web browser and navigate to 169.254.101.100.
- 4) To connect to the NETGEAR ProSAFE switch through the console Ethernet port, one could use a secure shell client, connecting to 192.168.40.1. We do not suggest this method.
- 5) To connect to the NETGEAR ProSAFE switch through the console USB port, one needs drivers on the computer:
 - a) The switch comes with a disk, but disks can also be found online on NETGEAR'S website.²
 - b) The switch also comes with a USB cable, a generic USB Type-A to Mini USB Type-B.

- c) The switch also comes with a USB-to-serial connector for console output.

5. Saving a Configuration

The user can change settings and apply them without worry, but unless the user saves the configuration through the Maintenance tab all the changes will be gone once it is powered off (Fig. 2). This is a blessing and a curse. Power cycles every time one makes a change, which can mess up the system. Save the configuration every time a successful change has been made to the configuration.

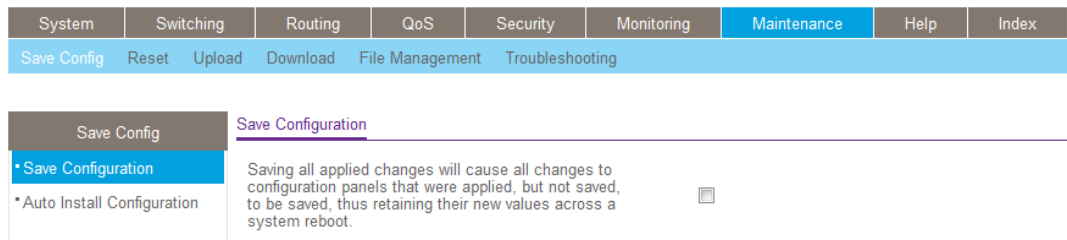


Fig. 2 Maintenance tab

6. Adding/Deleting Users

Use the following path to added or delete users:

Security→Management Security→Local User→User Management

The default administrator is “admin” without any password. The secondary account (in this case) is radar / ARLpassword12 for a more general audience. There is also a “guest” user without a password with read-only access.

This is where one can add/delete users. One cannot delete the account one has logged in with. We encourage using a password.

Under Security→Management Security→Login Sessions, one can keep track of who is logged in and from where.

7. Setting Up a DHCP Virtual Local Area Network (VLAN)

This process takes some time and understanding to master, because creating a new VLAN does not create the virtual interface to actually use that new VLAN.

It is worth explaining here that a DHCP server creates a local area network that will dynamically assign IP addresses to computers attached to the ports associated with that VLAN. Any devices not DHCP-capable, like software-designed radios, must

be assigned a static IPv4 address on the same subnet as the DHCP pool. In our case, that is 192.168.40.0/24.

7.1 Setting Up a New VLAN

Use the following path to set up a new VLAN:

Switching→VLAN→Basic→VLAN Configuration

The procedures for setting up the new VLAN (Fig. 3) are as follows:

- 1) Type the number of the new VLAN, any unused number between 2 and 4092.
- 2) The name field is optional.
- 3) Then click Add.

The figure consists of two screenshots of a network configuration interface titled "VLAN Configuration".

The top screenshot shows a table with the following data:

<input type="checkbox"/>	VLAN ID	VLAN Name	VLAN Type	Make Static
<input type="checkbox"/>	400	test		Disable ▾
<input type="checkbox"/>	1	default	Default	Disable
<input type="checkbox"/>	200	VLAN0200	Static	Disable

The bottom screenshot shows the same interface after adding the new VLAN. The table now includes the new entry:

<input type="checkbox"/>	VLAN ID	VLAN Name	VLAN Type	Make Static
<input type="checkbox"/>				Disable ▾
<input type="checkbox"/>	1	default	Default	Disable
<input type="checkbox"/>	200	VLAN0200	Static	Disable
<input type="checkbox"/>	400	test	Static	Disable

Fig. 3 Setting up a new VLAN

7.2 Add an Interface to the VLAN

Use the following path to add an interface to the VLAN:

Routing→VLAN→VLAN Routing Configuration

The procedures for adding an interface to the VLAN (Fig. 4) are as follows:

- 1) Select the new VLAN ID from the drop-down menu.

- 2) Assign an unused IP address with the last triplet as 1.

Remember this when creating the DHCP Pool, as it will use the same address.

- 3) Assign the subnet mask 255.255.255.0.
- 4) Then click Add.

VLAN Routing Configuration

<input type="checkbox"/>	VLAN ID	Port	MAC Address	IP Address	Subnet Mask
<input type="checkbox"/>	400 ▾			192.168.1.1	255.255.255.0
<input type="checkbox"/>	1	0/4/1	08:BD:43:71:58:4C	169.254.100.100	255.255.255.0
<input type="checkbox"/>	200	0/4/2	08:BD:43:71:58:4C	192.168.40.1	255.255.255.0

VLAN Routing Configuration

<input type="checkbox"/>	VLAN ID	Port	MAC Address	IP Address	Subnet Mask
<input type="checkbox"/>	▾				
<input type="checkbox"/>	1	0/4/1	08:BD:43:71:58:4C	169.254.100.100	255.255.255.0
<input type="checkbox"/>	200	0/4/2	08:BD:43:71:58:4C	192.168.40.1	255.255.255.0
<input type="checkbox"/>	400	0/4/3	08:BD:43:71:58:4C	192.168.1.1	255.255.255.0

Fig. 4 Adding an interface

7.3 Untag All Ports

Use the following path to untag all of the ports:

Switching→VLAN→Advanced→VLAN Membership

The procedures for untagging all of the ports (Fig. 5) are as follows:

- 1) Select the VLAN from the drop-down menu.
- 2) In the Group Operation drop-down menu, select Tag All, then Untag All.
- 3) Then click Apply.

With only one network switch box, do not tag anything. With a second network box, one might have to read up on tagging.³

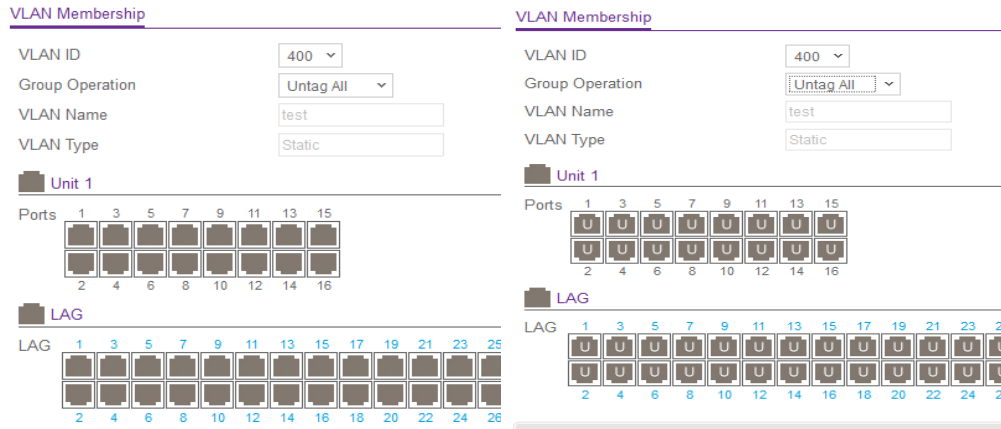


Fig. 5 Untagging all ports

7.4 Assign Ports to Use VLAN

Use the following path to assign ports to the VLAN:

Switching→VLAN→Advanced→Port PVID Configuration

One needs ports that will connect to the new VLAN and automatically get an IP address in that VLAN, so one must assign ports to use our VLAN (Fig. 6). Since all of the ports are untagged, this step might not strictly be necessary, but it keeps the switch in the loop, so do not leave these steps out.

- 1) Check the boxes on all the ports we want to be part of our new VLAN.
- 2) In the PVID column, type the VLAN ID of our new VLAN.
- 3) Then click Apply.

Note: One can double check VLAN membership here. Under the VLAN Member column, all the VLAN IDs should be there separated by commas. One can also double check that they are all untagged: if they are all comma separated under the Untagged VLANs column and the Tagged VLANs column says “None”.

PVID Configuration					PVID Configuration				
1 LAG All					1 LAG All				
<input type="checkbox"/>	Interface	PVID	VLAN Member	VLA	<input type="checkbox"/>	Interface	PVID	VLAN Member	VLA
		400							
<input type="checkbox"/>	1/0/1	200	1,200,400	Non	<input type="checkbox"/>	1/0/1	200	1,200,400	Non
<input type="checkbox"/>	1/0/2	200	1,200,400	Non	<input type="checkbox"/>	1/0/2	200	1,200,400	Non
<input type="checkbox"/>	1/0/3	200	1,200,400	Non	<input type="checkbox"/>	1/0/3	200	1,200,400	Non
<input type="checkbox"/>	1/0/4	200	1,200,400	Non	<input type="checkbox"/>	1/0/4	200	1,200,400	Non
<input type="checkbox"/>	1/0/5	200	1,200,400	Non	<input type="checkbox"/>	1/0/5	200	1,200,400	Non
<input type="checkbox"/>	1/0/6	200	1,200,400	Non	<input type="checkbox"/>	1/0/6	200	1,200,400	Non
<input type="checkbox"/>	1/0/7	200	1,200,400	Non	<input type="checkbox"/>	1/0/7	200	1,200,400	Non
<input type="checkbox"/>	1/0/8	200	1,200,400	Non	<input type="checkbox"/>	1/0/8	200	1,200,400	Non
<input checked="" type="checkbox"/>	1/0/9	200	1,200,400	Non	<input type="checkbox"/>	1/0/9	400	1,200,400	Non
<input checked="" type="checkbox"/>	1/0/10	200	1,200,400	Non	<input type="checkbox"/>	1/0/10	400	1,200,400	Non
<input type="checkbox"/>	1/0/11	200	1,200,400	Non	<input type="checkbox"/>	1/0/11	200	1,200,400	Non
<input type="checkbox"/>	1/0/12	200	1,200,400	Non					
<input type="checkbox"/>	1/0/13	200	1,200,400	Non					
<input type="checkbox"/>	1/0/14	200	1,200,400	Non					

Fig. 6 Assigning ports

7.5 Excluding IP Addresses

Use the following path to exclude IP addresses:

System→Services→DHCP Server Configuration→Excluded Address

Excluding IP addresses is important for the computer as they are assign statically. In order to make sure the DHCP server does not hand out an IP address already being used by one of those computers, one must exclude the one being used (in our case, we must exclude 192.168.40.1).

The procedures for excluding IP addresses (Fig. 7) are as follows:

- 1) In both columns, type the IP address from the VLAN Routing Configuration used to create the VLAN interface by typing a range in here; the user can exclude a greater range of IP addresses. Remember, the range is inclusive.
- 2) Then click Add.

Excluded Address			Excluded Address		
<input type="checkbox"/>	IP Range From	IP Range To	<input type="checkbox"/>	IP Range From	IP Range To
	192.168.1.1	192.168.1.1			
<input type="checkbox"/>	192.168.40.1	192.168.40.1	<input type="checkbox"/>	192.168.40.1	192.168.40.1
			<input type="checkbox"/>	192.168.1.1	192.168.1.1

Fig. 7 Excluding IP addresses

7.6 Setting Up a DHCP Pool

Use the following path to set up a DHCP pool:

System→Services→DHCP Server→DHCP Pool Configuration

Under this menu, use these settings:

- 1) Pool Name: Create
- 2) Pool Name: Pick any one that is not already found in the drop-down menu.
- 3) Type of Binding: Dynamic
- 4) Network Address: A subnet that is not already in use, with the last triplet being 0 (for example, 192.168.1.0).
- 5) Network Mask: 255.255.255.0

Note: Instead one could type “24” into the Network Prefix Length option, but one cannot do both.

- 6) Lease Time: Specified Duration
- 7) Days: 1

Note: This could be any amount of time, but 1 day is fairly standard in industry.

Once the settings have been adjusted, click Apply. Figure 8 shows the DHCP Pool Configuration window.

DHCP Pool Configuration		DHCP Pool Configuration	
Pool Name	Create	Pool Name	dynamic_pool_second
Pool Name	dynamic_pool_second (1 to 31 alp	Type of Binding	Dynamic
Type of Binding	Dynamic	Network Address	192.168.1.0
Network Address	192.168.1.0	Network Mask	255.255.255.0
Network Mask	255.255.255.0	Network Prefix Length	(0 to 32)
Network Prefix Length	(0 to 32)	Client Name	
Client Name		Hardware Address	
Hardware Address		Hardware Address Type	Ethernet
Hardware Address Type	Ethernet	Client ID	
Client ID		Host Number	
Host Number		Host Mask	
Host Mask		Host Prefix Length	(1-32)
Host Prefix Length	(1-32)	Lease Time	Specified Duration
Lease Time	Specified Duration	Days	1 (0 to 59)
Days	1 (0 to 59)	Hours	0 (0 to 23)
Hours	0 (0 to 23)	Minutes	0 (0 to 59)

Fig. 8 DHCP pool configuration

8. Static Network

Configuring a static network is the simplest, most straightforward setup one can achieve on this network switch. However, connecting 2 or more computers to the network in this way makes all the features of the network switch useless.

First, assign a static IPv4 on each computer/device connected. Makes sure all computers/devices share the same subnet (e.g., 192.168.1.0) and change the last triplet for each one. Connect them all to the switch and they will be able to see one other.

To keep certain computers' IP addresses static without having to reassign the same IP in the network adapter every time the user connects, it is possible to configure on the network switch by 1) excluding the IP address from the DHCP pool and 2) configuring the DHCP server to automatically assign the computer's media access control (MAC) address the desired IP address. Note: If the computer has multiple Ethernet ports, one must connect from the same port on the machine to take advantage of this feature or else set it up with the MAC address of each port.

Finally, to connect using an IP address that was dynamically assigned, one can clear all dynamic bindings by navigating to System→Services→DHCP Bindings Information and then clicking Clear. The DHCP server will automatically reassign all those connections, but avoid the IP of the computer connected statically.

The DHCP server automatically assigns the lowest available IP address. Assigning a static IP higher in the subnet helps avoid IP address conflicts. For example, 192.168.40.200 will almost never be assigned by the DHCP server, so it is a good place to assign a static IP. One will also need to exclude this address from the DHCP server.

9. Port Aggregation/Link Aggregation Control Protocol

The ports on the computer that are connected to the link aggregation group (LAG) on the network switch also need to be set up for port trunking. This report does not go into detail on the process for each computer, because, depending on the operating system, the process varies greatly.

9.1 Adding LAG to VLAN

This is very similar to setting up the DHCP server; however, now the user needs to add the LAG ports to the VLAN, too. If one followed the steps for adding all ports to a DHCP, this may have been done already.

Use the following path to add the LAG ports to the VLAN:

Switching→VLAN→Advanced→Port PVID Configuration

The procedures for adding the LAG ports to the VLAN are as follows:

- 1) Above the list, click on LAG.

- 2) Check the LAG to change (or all of them).
- 3) Type the ID of the VLAN in the PVID column.
- 4) Then click Apply.

9.2 Adding Ports to LAG

Use the following path to add ports to the LAG:

Switching→LAG→LAG Membership

The procedures for adding ports to the LAG (Fig. 9) are as follows:

- 1) For LAG ID, pick the ID of the desired LAG.
- 2) LAG name can be changed to anything. Name it something that will be a reminder of what it is connected to.
- 3) Select the Hash Mode desired.
- 4) On the Unit 1 box at the bottom, select the ports. They should have a check on them now.
- 5) Then click Apply.

LAG Membership

LAG ID: Lag 1

LAG Name: SDR

LAG Description:

Admin Mode: Enable

Link Trap: Disable

STP Mode: Enable

Static Mode: Enable

Hash Mode: Src/Dest MAC, VLAN, EType, incoming port

Unit 1

Ports	1	3	5	7	9	11	13	15
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2	4	6	8	10	12	14	16

Fig. 9 Adding ports to the LAG

9.3 Checking the LAG

Use the following path to check the LAG:

Switching→LAG→LAG Configuration

The LAG recently changed with the new settings and the ports should be listed (Fig. 10).




	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports	Active Ports
				v	v	v	v	v		
	SDR		lag 1	Enabled	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Enable	Disable	1/0/9, 1/0/10	
	ch2		lag 2	Enabled	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable		
	ch3		lag 3	Enabled	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable		

Fig. 10 LAG settings and ports

10. Stacking Switches

Use the following path to stack the switches:

System→Stacking

This looks self-explanatory, but is currently untested.

One can use the following path—Security→Traffic Control→Private Vlan→Private Vlan Type Configuration—when separating 2 or more VLANs on one network switch.

11. Conclusion

A managed network switch, such as the NETGEAR m4300, has a great many ways to set it up. To avoid filling up pages with text, many options are abbreviated, increasing the barrier to entry for a new network manager. In this technical note, we hope the learning curve for this particular managed network switch was greatly decreased for a new user. The other goal was to help the average user to more quickly understand how this particular network switch was set up in order to achieve the desired performance. It should be noted that the setup outlined in this technical note is not the optimal setup for the fastest throughput or lowest latency. Although the network is fast, a more exact knowledge of the computers that will be connected to the network would allow for more precise control of the packets through the network switch, reducing latency for the network as a whole. As previously mentioned, a multiple VLAN setup may also increase throughput. Both of these were beyond the scope of this report, as this is a simple setup guide.

12. References

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